

CLAIMS

What is claimed is:

- Sub B1* →
- 1 1. A particle shield, comprising:
- 2 a plurality of flexible shield layers;
- 3 a resilient support layer between adjacent ones of the flexible shield layers;
- 4 a protective cover configured to enclose the flexible shield layers; and
- 5 fasteners associated with the protective cover and capable of releasably securing
- 6 the flexible shield layers to a structure to be protected.
- 1 2. The particle shield of claim 1, wherein the support layer includes a space
- 2 qualified open-cell foam.
- 1 3. The particle shield of claim 1, wherein the support layer includes a space
- 2 qualified closed-cell foam.
- 1 4. The particle shield of claim 3, wherein each cell of the closed-cell foam
- 2 contains a predetermined low pressure gas.
- 1 5. The particle shield of claim 1, wherein the support layer includes a
- 2 ceramic foam.

1 6. The particle shield of claim 1, wherein the support layer has one or more
2 portions removed therefrom.

1 7. The particle shield of claim 1, wherein the fasteners include one or more
2 Velcro™ fasteners.

1 8. The particle shield of claim 1, wherein the fasteners include one or more
2 snap fasteners.

1 9. The particle shield of claim 1, wherein the fasteners include one or more
2 straps.

1 10. The particle shield of claim 1, wherein at least one of the flexible shield
2 layers is made of a ceramic fabric.

1 11. The particle shield of claim 1, wherein at least one of the flexible shield
2 layers is made of a high-strength fabric.

1 12. The particle shield of claim 1, further comprising at least one thermal
2 insulation layer.

1 13. The particle shield of claim 1, wherein the protective cover is made of an
2 abrasion resistant material that has an absorptivity to emissivity ratio selected to provide
3 a predetermined level of thermal protection.

1 14. The particle shield of claim 1, wherein the protective cover is vented.

2 15. The particle shield of claim 1, wherein the protective cover is flame
3 retardant.

4 16. The particle shield of claim 1, wherein the protective cover is optically
5 reflective or absorptive.

6 17. A protection system against hypervelocity particles, comprising:
7 means for shocking the impacting hypervelocity particles to thereby substantially
8 fragment or vaporize the hypervelocity particles;
9 means for supporting the shocking means in a resilient manner;
10 means for enclosing the shocking means in a cover layer; and
11 means for securing the shocking means on a structure to be protected.

1 18. The protection system of claim 17, further comprising means for reducing
2 a size and volume occupied by the protection system.

1 19. The protection system of claim 17, further comprising means for
2 deploying the shocking means on a structure to be protected.

1 20. The protection system of claim 17, further comprising means for thermally
2 insulating the shocking means.

1 21. The protection system of claim 17, further comprising means for
2 substantially venting gas particles produced by the impact of the hypervelocity particles.

1 22. The protection system of claim 17, further comprising means for
2 substantially containing debris produced by the impact of the hypervelocity particles.

1 23. A method of protecting against hypervelocity particles using a flexible
2 multi-shock shield, the method comprising:

3 reducing a size and volume occupied by the flexible multi-shock shield;
4 transporting the flexible multi-shock shield to a desired location;
5 expanding the flexible multi-shock shield to its initial size and volume;
6 securing the flexible multi-shock shield on a structure to be protected; and
7 shocking the hypervelocity particles with the flexible multi-shock shield.

1 24. The method of claim 23, further comprising conforming the flexible
2 multi-shock shield to a surface of the structure to be protected.

1 25. The method of claim 23, further comprising releasing the flexible
2 multi-shock shield from the structure to be protected.

1 26. The method of claim 23, further comprising stowing the reduced volume
2 flexible multi-shock shield in a storage location.

1 27. A hypervelocity particle shield, comprising:
2 a plurality of spaced apart flexible shield layers, at least one of which is made of a
3 flexible ceramic fabric;
4 a resilient support layer between adjacent ones of the flexible shield layers, the
5 resilient support layer including at least one space qualified foam layer;
6 at least one thermal insulation layer disposed on the plurality of flexible shield
7 layers;
8 a vented, abrasion resistant protective cover configured to enclose the flexible
9 shield layers and having an absorptivity to emissivity ratio selected to provide a
10 predetermined level of thermal protection; and
11 fasteners attached to the protective cover and capable of releasably securing the
12 flexible shield layers to a structure to be protected.

1 28. The hypervelocity particle shield of claim 27, wherein the space qualified
2 foam layer includes an open-cell foam layer.

1 29. The hypervelocity particle shield of claim 27, wherein the space qualified
2 foam layer includes a closed-cell foam layer, each cell therein containing a predetermined
3 low-pressure gas.

1 30. The hypervelocity particle shield of claim 27, wherein the support layer
2 further includes a ceramic foam layer.

1 31. The hypervelocity particle shield of claim 27, wherein the support layer
2 has one or more portions removed therefrom.

1 ³²
~~30.~~ The hypervelocity particle shield of claim 27, wherein the fasteners
2 include one or more snap fasteners.

1 ³³
~~31.~~ The hypervelocity particle shield of claim 27, wherein the fasteners
2 include one or more straps.

1 ³⁴
~~32.~~ The hypervelocity particle shield of claim 27, wherein the fasteners
2 include at least one Velcro™ fastener.